WHAT IS CLAIMED IS:

1. A method of manufacturing a molded composite structure, comprising:

preparing a material stack, wherein the material stack comprises a core section having first and second opposing sides;

preparing a resin;

preparing a mold;

placing the material stack in the mold;

sealing the core section;

infusing the mold and material stack with the resin to form the structure;

curing the structure; and

removing the structure from the mold.

2. The method of claim 1, wherein material stack preparing further comprises:

applying a laminate layer on at least one of the first side and the second side of the core section.

3. The method of claim 1, wherein material stack preparing further comprises:

preparing at least two material stacks, wherein at least one of the material stacks comprises a core section having first and second opposing sides and at least one of the material stacks does not comprise a core section;

4. The method of claim 1, wherein material stack preparing further comprises:

applying a thermoplastic barrier layer on at least one of the first side and the second side of the core section.

5. The method of claim 4, wherein material stack preparing further comprises:

applying an adhesive layer between the core section and the thermoplastic barrier layer.

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6. The method of claim 5, wherein material stack preparing further comprises:

applying a support layer between the core section and the adhesive layer.

7. The method of claim 6, wherein material stack preparing further comprises:

applying a laminate layer on the thermoplastic barrier layer.

8. The method of claim 7, wherein laminate layer applying further comprises:

applying the laminate layer with a specified fiber orientation.

9. The method of claim 8, wherein mold preparing further comprises:

reducing the modification of the fiber orientation during resin infusion.

10. The method of claim 9, wherein the mold comprises a shape and an internal pressure and wherein reducing further comprises:

altering the shape and the internal pressure of the mold.

11. The method of claim 7, wherein core sealing further comprises:

curing the thermoplastic barrier layer.

12. The method of claim 1, wherein mold preparing further comprises:

preparing a first tool to form an exterior shape of the structure; and

preparing a second tool to form an interior shape of the structure.

13. The method of claim 12, wherein the second tool includes an elastomeric tool.

14. The method of claim 1, wherein placing further comprises:

applying a release agent to the mold and to the material stack; and

placing the material stack in the mold.

15. The method of claim 1, wherein the material stack includes cavities, and wherein infusing further comprises:

closing the mold;

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sealing the mold;

creating a vacuum in the mold; and

infusing the mold with the resin until the cavities in the material stack are filled with resin.

16. The method of claim 1, wherein curing further comprises:

applying heat to the mold.

17. The method of claim 1, wherein curing further comprises:

applying pressure to the mold.

18. The method of claim 1, wherein the structure has an exterior surface resulting in a smooth laminar flow of air over that surface.

19. The method of claim 1, wherein the structure is a wing panel for an aircraft.

20. The method of claim 1, wherein the structure is a semi-span wing for an aircraft.

21. The method of claim 1, wherein the structure is a full-span wing for an aircraft.

22. A system for manufacturing a molded composite structure, comprising:

a first preparing component configured to prepare a material stack, wherein the material stack comprises a core section having first and second opposing sides;

a second preparing component configured to prepare a resin;

a third preparing component configured to prepare a mold;

a placing component configured to place the material stack in the mold;

a sealing component configured to seal the core section;

an infusing component configured to infuse the mold and material stack with the resin to form the structure;

a curing component configured to cure the structure; and

a removing component configured to remove the structure from the mold.

23. The system of claim 22, wherein the first preparing component further comprises:

a first applying component configured to apply a laminate layer on at least one of the first side and the second side of the core section.

24. The system of claim 22, wherein the first preparing component further comprises:

a fourth preparing component configured to prepare at least two material stacks, wherein at least one of the material stacks comprises a core section having first and second opposing sides and at least one of the material stacks does not comprise a core section;

25. The system of claim 22, wherein the first preparing component further comprises:

a first applying component configured to apply a thermoplastic barrier layer on at least one of the first side and the second side of the core section.

26. The system of claim 25, wherein the first preparing component further comprises:

a second applying component configured to apply an adhesive layer between the core section and the thermoplastic barrier layer.

27. The system of claim 26, wherein the first preparing component further comprises:

a third applying component configured to apply a support layer between the core section and the adhesive layer.

28. The system of claim 27, wherein the first preparing component further comprises:

a fourth applying component configured to apply a laminate layer on the thermoplastic barrier layer.

29. The system of claim 28, wherein the fourth applying component further comprises:

a fifth applying component configured to apply the laminate layer with a specified fiber orientation.

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30. The system of claim 29, wherein the third preparing component further comprises:

a reducing component configured to reduce the modification of the fiber orientation during resin infusion.

31. The system of claim 30, wherein the mold comprises a shape and an internal pressure and wherein the reducing component further comprises:

an altering component configured to alter the shape and the internal pressure of the mold.

32. The system of claim 28, wherein the sealing component further comprises:

a second curing component configured to cure the thermoplastic barrier layer.

33. The system of claim 22, wherein the third preparing component further comprises:

a fourth preparing component configured to prepare a first tool to form an exterior shape of the structure; and

a fifth preparing component configured to prepare a second tool to form an interior shape of the structure.

34. The system of claim 22, wherein the second tool includes an elastomeric tool.

35. The system of claim 22, wherein the placing component further comprises:

an applying component configured to apply a release agent to the mold and to the material stack; and

a placing component configured to place the material stack in the mold.

36. The system of claim 22, wherein the material stack includes cavities, and wherein the infusing component further comprises:

a closing component configured to close the mold;

a second sealing component configured to seal the mold;

a creating component configured to create a vacuum in the mold; and

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an infusing component configured to infuse the mold with the resin until the cavities in the material stack are filled with resin.

37. The method of claim 22, wherein the curing component further comprises:

an applying component configured to apply heat to the mold.

38. The method of claim 22, wherein the curing component further comprises:

an applying component configured to apply pressure to the mold.

39. The system of claim 22, wherein the structure has an exterior surface resulting in a smooth laminar flow of air over that surface.

40. The system of claim 22, wherein the structure is a wing panel for an aircraft.

41. The system of claim 22, wherein the structure is a semi-span wing for an aircraft.

42. The system of claim 22, wherein the structure is a full-span wing for an aircraft

43. A computer readable medium containing instructions for controlling a computer system to perform a method of manufacturing a molded composite structure, the method comprising:

preparing a material stack, wherein the material stack comprises a core section having first and second opposing sides;

preparing a resin;

preparing a mold;

placing the material stack in the mold;

sealing the core section;

infusing the mold and material stack with the resin to form the structure;

curing the structure; and

removing the structure from the mold.

44. A system for manufacturing a molded composite structure, comprising:

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first preparing means for preparing a material stack, wherein the material stack comprises a core section having first and second opposing sides;

second preparing means for preparing a resin;

third preparing means for preparing a mold;

placing means for placing the material stack in the mold;

sealing means for sealing the core section;

infusing means for infusing the mold and material stack with the resin to form the structure;

curing means for curing the structure; and

removing means for removing the structure from the mold.

45. A method of manufacturing a molded composite structure, comprising:

preparing at least one material stack, wherein the material stack comprises a core section and cavities, and wherein the core section comprises first and second opposing sides;

preparing a resin;

preparing a first tool to form an exterior shape of the structure;

preparing a second tool to form an interior shape of the structure;

integrating the second tool with the material stack;

placing the material stack with the second tool inside of the first tool;

sealing the core section of the material stack;

infusing the first tool with the resin until the cavities in the material stack are filled with resin to form the structure;

curing the structure;

removing the structure from the first tool; and

removing the second tool from the structure.

46. The method of claim 45, wherein material stack preparing further comprises:

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preparing at least two material stacks, wherein at least one of the material stacks comprises a core section having first and second opposing sides and at least one of the material stacks does not comprise a core section;

47. The method of claim 45, wherein material stack preparing further comprises:

applying a first support layer on the first side of the core section; and

applying a second support layer on the second side of the core section.

48. The method of claim 47, wherein material stack preparing further comprises:

applying a first adhesive layer on the first support layer; and

applying a second adhesive layer on the second support layer.

49. The method of claim 48, wherein material stack preparing further comprises:

applying a first thermoplastic barrier layer on the first adhesive layer; and

applying a second thermoplastic barrier layer on the second adhesive layer.

50. The method of claim 49, wherein material stack preparing further comprises:

applying a first laminate layer on the first thermoplastic barrier layer; and

applying a second laminate layer on the second thermoplastic barrier layer.

51. The method of claim 50, wherein core sealing further comprises:

curing the first and second thermoplastic barrier layers.

52. The method of claim 50, wherein first laminate layer applying and second laminate layer applying further comprise:

applying the first and second laminate layer with a specified fiber orientation.

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53. The method of claim 52, wherein first tool preparing and second tool preparing further comprises:

reducing the modification of the fiber orientation during resin infusion.

54. The method of claim 53, wherein the first tool comprises a shape and an internal pressure and wherein reducing further comprises:

altering the shape and the internal pressure of the first tool.

55. The method of claim 45, wherein the second tool includes an elastomeric tool.

56. The method of claim 55, wherein infusing further comprises:

altering the internal pressure in the elastomeric tool to alter the rate of infusion.

57. The method of claim 45, wherein integrating further comprises:

applying a release agent to the second tool; and

placing the second tool in the material stack.

58. The method of claim 45, wherein placing further comprises:

applying a release agent to the first tool; and

placing the material stack with the second tool inside the first tool.

59. The method of claim 51, wherein thermoplastic barrier layer curing and structure curing occurs at substantially the same temperature.

60. The method of claim 51, wherein thermoplastic barrier layer curing occurs at a higher temperature than structure curing.

61. The method of claim 51, wherein thermoplastic barrier layer curing occurs at a lower temperature than structure curing.

62. The method of claim 45, wherein infusing further comprises:

sealing the first tool; and

creating a vacuum in the first tool.

63. The method of claim 45, wherein curing further comprises:

applying heat to the to the structure; and

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applying pressure to the structure.

64. The method of claim 45, wherein the structure is a wing panel for an aircraft.

65. The method of claim 45, wherein the structure is a semi-span wing for an aircraft.

66. The method of claim 45, wherein the structure is a full-span wing for an aircraft.

67. A system for manufacturing a molded composite structure, comprising:

a first preparing component configured to prepare at least one material stack, wherein the material stack comprises a core section and cavities, and wherein the core section comprises first and second opposing sides;

a second preparing component configured to prepare a resin;

a third preparing component configured to prepare a first tool to form an exterior shape of the structure;

a fourth preparing component configured to prepare a second tool to form an interior shape of the structure;

an integrating component configured to integrate the second tool with the material stack;

a placing component configured to place the material stack with the second tool inside of the first tool;

a sealing component configured to seal the core section of the material stack;

an infusing component configured to infuse the first tool with the resin until the cavities in the material stack are filled with resin to form the structure;

a first curing component configured to cure the structure;

a first removing component configured to remove the structure from the first tool; and

a second removing component configured to remove the second tool from the structure.

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68. The system of claim 67, wherein the first preparing component further comprises:

a fifth preparing component configured to prepare at least two material stacks, wherein at least one of the material stacks comprises a core section having first and second opposing sides and at least one of the material stacks does not comprise a core section;

69. The system of claim 67, wherein the first preparing component further comprises:

a first applying component configured to apply a first support layer on the first side of the core section; and

a second applying component configured to apply a second support layer on the second side of the core section.

70. The system of claim 69, wherein the first preparing component further comprises:

a third applying component configured to apply a first adhesive layer on the first support layer; and

a fourth applying component configured to apply a second adhesive layer on the second support layer.

71. The method of claim 70, wherein the first preparing component further comprises:

a fifth applying component configured to apply a first thermoplastic barrier layer on the first adhesive layer; and

a sixth applying component configured to apply a second thermoplastic barrier layer on the second adhesive layer.

72. The method of claim 71, wherein the first preparing component further comprises:

a seventh applying component configured to apply a first laminate layer on the first thermoplastic barrier layer; and

an eighth applying component configured to apply a second laminate layer on the second thermoplastic barrier layer.

73. The system of claim 72, wherein the sealing component further comprises:

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a second curing component configured to cure the first and second thermoplastic barrier layers.

74. The system of claim 73, wherein the seventh applying component and the eighth applying component further comprise:

a ninth applying component configured to apply the first and second laminate layer with a specified fiber orientation.

75. The system of claim 74, wherein the third preparing component and the fourth preparing component further comprise:

a reducing component configured to reduce the modification of the fiber orientation during resin infusion.

76. The system of claim 75, wherein the first tool comprises a shape and an internal pressure and wherein the reducing component further comprises:

an altering component configured to alter the shape and the internal pressure of the first tool.

77. The system of claim 67, wherein the second tool includes an elastomeric tool.

78. The system of claim 77, wherein the infusing component further comprises:

an altering component configured to alter the internal pressure in the elastomeric tool to alter the rate of infusion.

79. The system of claim 67, wherein the integrating component further comprises:

a first applying component configured to apply a release agent to the second tool; and

a second placing component configured to place the second tool in the material stack.

80. The system of claim 67, wherein the placing component further comprises:

a first applying component configured to apply a release agent to the first tool; and

a placing component configured to place the material stack with the second tool inside the first tool.

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81. The system of claim 73, wherein the first curing component and the second curing component are component configured to cure at substantially the same temperature.

82. The system of claim 73, wherein the first curing component is configured to cure at a higher temperature than the second curing component.

83. The system of claim 73, wherein the first curing component is configured to cure at a lower temperature than the second curing component.

84. The system of claim 67, wherein the infusing component further comprises:

a second sealing component configured to seal the first tool; and

a creating component configured to create a vacuum in the first tool.

85. The system of claim 67, wherein the first curing component further comprises:

a first applying component configured to apply heat to the to the structure; and

a second applying component configured to apply pressure to the structure.

86. The system of claim 67, wherein the structure is a wing panel for an aircraft.

87. The system of claim 67, wherein the structure is a semi-span wing for an aircraft.

88. The system of claim 67, wherein the structure is a full-span wing for an aircraft.

89. A computer readable medium containing instructions for controlling a computer system to perform a method of manufacturing a molded composite structure, the method comprising:

preparing at least one material stack, wherein the material stack comprises a core section and cavities, and wherein the core section comprises first and second opposing sides;

preparing a resin;

preparing a first tool to form an exterior shape of the structure;

preparing a second tool to form an interior shape of the structure;

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integrating the second tool with the material stack;

placing the material stack with the second tool inside of the first tool;

sealing the core section of the material stack;

infusing the first tool with the resin until the cavities in the material stack are filled with resin to form the structure;

curing the structure;

removing the structure from the first tool; and

removing the second tool from the structure.

90. A system for manufacturing a molded composite structure, comprising:

first preparing means for preparing at least one material stack, wherein the material stack comprises a core section and cavities, and wherein the core section comprises first and second opposing sides;

second preparing means for preparing a resin;

third preparing means for preparing a first tool to form an exterior shape of the structure;

fourth preparing means for preparing a second tool to form an interior shape of the structure;

integrating means for integrating the second tool with the material stack;

placing means for placing the material stack with the second tool inside of the first tool;

sealing means for sealing the core section of the material stack;

infusing means for infusing the first tool with the resin until the cavities in the material stack are filled with resin to form the structure;

curing means for curing the structure;

first removing means for removing the structure from the first tool; and

second removing means for removing the second tool from the structure.

91. A wing panel for an aircraft, comprising:

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an external skin having a substantially smooth laminar surface, the external skin including multiple layers of a cured material;

a sealed core material located within the external skin, the core material having first and second side opposing sides; and

a support element disposed within the external skin, the external skin and support element being co-bonded or co-cured together.

92. The wing panel of claim 91, wherein the external skin includes at least two layers of a laminate material.

93. The wing panel of claim 91, wherein the sealed core material comprises:

a thermoplastic barrier layer on at least one of the first side and the second side of the core material.

94. The wing panel of claim 93, wherein the sealed core material comprises:

an adhesive layer between the core material and the thermoplastic barrier layer.

95. The wing panel of claim 94, wherein the sealed core material comprised:

a support layer between the core material and the adhesive layer.

96. The wing panel of claim 91, wherein the sealed core material comprises:

a first support layer disposed on the first side of the core material;

a second support layer disposed on the second side of the core material;

a first adhesive layer disposed on the first support layer;

a second adhesive layer disposed on the second support layer;

a first thermoplastic barrier layer disposed on the first adhesive layer;

a second thermoplastic barrier layer disposed on the second adhesive layer;

a first laminate layer disposed on the first thermoplastic barrier layer; and

a second laminate layer disposed on the second thermoplastic barrier layer.

97. The wing panel of claim 91, wherein the internal support element includes a spar.

98. The wing panel of claim 97, wherein the internal support element includes a rib.

99. The wing panel of claim 98, wherein the internal support element includes a fuel tank.

100. The wing panel of claim 99, wherein the internal support element includes an attachment hard point.

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